



- Discuss what assumptions you made.
- Comment on any other things that you wondered about.

Thinking about the inquiry questions from the beginning of this chapter:

- Discuss whether what you have learned in this chapter has helped you to think about an answer to these questions.
- Consider whether there are any that you are interested in and would like to explore further, perhaps for your internal assessment topic.

Chapter review

Click here for a mixed review exercise



- 1 Prabu took a note of the heights of 12 of her classmates and timed how many seconds it took them to run the 100-metre dash. Her data is shown in the table.

Height, cm	Time, s
151	17.5
153	18
153	16.5
154	16
155	15.4
159	13.2
162	14
164	13.7
164	13.2
168	12.5
175	12
181	12

- a Calculate Spearman's rank correlation coefficient (r_s) for this data.
- b Interpret the value of r_s and comment on its validity.
- 2 Ibrahim belongs to a tennis club. He watched a match played by each of the top eight tennis players and recorded the number of aces that they hit. The results are:

Tennis rank	1	2	3	4	5	6	7	8
Number of aces	10	7	4	6	5	5	3	1

- a Explain why it might not be appropriate to use the PMCC in this case.
- b Calculate Spearman's rank correlation coefficient (r_s) for this data.
- c Interpret the value of r_s and comment on its validity.

- 3 The colours of the eggs laid by three different types of hens were recorded.

Hen	Leghorn	Brahma	Sussex
White eggs	5	23	14
Brown eggs	25	7	16

Phoebe was interested to find out whether the colour of the eggs was independent of the type of hen. She decided to perform a χ^2 test at the 5% significance level on her data.

- a Write down the null and alternative hypotheses.
- b Show that the expected value of a Leghorn laying a white egg is 14.
- c Write down the number of degrees of freedom.
- d Find the χ^2 test statistic and the p -value.
- e The critical value is 5.991. State the conclusion for this test.
- 4 Bert wanted to find out whether there was any relationship between gender and favourite colour of car. He collected data from 100 people and performed a χ^2 test at the 10% significance level.

Colour	Black	White	Red	Silver
Male	15	6	18	9
Female	16	14	7	15

- a Write down the null and alternative hypotheses.
- b Show that the expected number of males whose favourite colour of car is white is 9.6.



- c Write down the number of degrees of freedom.
- d Find the χ^2 test statistic and the p -value.
- e The critical value is 6.251; state the conclusion for this test.

- 5 Each of the 140 members of a running club trains once a week in order to run a half-marathon. The number who train each day is shown in the table.

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Observed frequencies	21	15	17	18	16	21	32

- a If the members are free to run on any day of the week, write down the table of expected values.
- b Write down the number of degrees of freedom.

The critical value is 12.592.

- c Determine the results of a goodness of fit test at the 5% significance level to find out whether the data fits a uniform distribution. Remember to write down the null and alternative hypotheses.

- 6 Benny tosses a fair die 90 times. The results are:

Number on die	1	2	3	4	5	6
Frequency	13	15	17	16	14	15

- a Find the expected frequencies.
- b Write down the number of degrees of freedom.

The critical value is 15.086.

- c Determine the results of a goodness of fit test at the 1% significance level to find out whether Benny's data fits a uniform distribution. Remember to write down the null and alternative hypotheses.

- 7 Marilu tosses two unbiased coins 60 times. The number of tails that she gets is shown in the table.

Number of tails	0	1	2
Frequency	12	34	14

- a Show that the expected frequency for getting 0 tails is 15.
- b Find the table of expected frequencies.
- c State whether there are any expected values less than 5.

- d Write down the number of degrees of freedom.
- e Determine the results of a goodness of fit test at the 5% significance level to find out whether the data fits a binomial distribution. Remember to write down the null and alternative hypotheses.

The critical value for this test is 5.991.

- f State the conclusion for the test and give a reason for your answer.

- 8 The heights of 14-year-old girls are normally distributed with a mean of 158 cm and standard deviation of 4 cm. Giorgio measures 500 14-year-old girls and his results are shown in the table.

Height, x cm	$x < 152$	$152 \leq x < 156$	$156 \leq x < 160$	$160 \leq x < 164$	$x \geq 164$
Frequency	12	133	201	109	45

- a Find the table of expected frequencies.
- b State whether there are any expected values less than 5.
- c Write down the degrees of freedom.
- d Determine the results of a goodness of fit test at the 10% significance level to find out whether the data fits a normal distribution. Remember to write down the null and alternative hypotheses.

The critical value for this test is 7.779.

- e State the conclusion for the test and give a reason for your answer.

- 9 Mrs Nelson gave her two Grade 12 classes the same history test. She wanted to find out whether one class was better than the other or not. The results of the test are:

Class 1	79	63	42	88	95	57	73	61	82	76	51	48
Class 2	65	78	85	49	59	91	68	74	82	56		

- a Write down the null and alternative hypotheses.
- b State whether this a one-tailed test or a two-tailed test.
- c Find the t -value and p -value for a t -test at the 5% significance level.
- d Write down the conclusion to the test.